Kingdom of Bahrain
Arabian Gulf University
College of Medicine and Medical Sciences

Kaplan Videos (Notes)

Year 5 (Obstetrics)

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Chapter (1): Reproductive Basics

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Physiological changes in pregnancy

- Hormones of pregnancy

① hCG1 (the most important) : β-subunit is unique & specific for pregnancy
- checked in cases of
  - amenorrhea (suspecting pregnancy)
  - Abnormal bleeding
  - Pelvic pain (suspecting ectopic pregnancy)
  - Pelvic mass (pregnant uterus)
  - Enlarged uterus
- It is produced by (syncytiotrophoblast) → once they invade maternal sinusoids on 2nd week of gestation
- Peak is in 1st trimester (9-10 weeks) → starting to decline at around 20 wks.
- ↑ β-hCG1 is detected at molar pregnancy
- Why secreted → to maintain corpus luteum which secreting progesterone that is important to maintain the endometrium for pregnancy

② hPL (human chorionic somatomamotropin = fetal GH!):
- Rises throughout pregnancy (not decreasing such as β-hCG1)
- Antagonizes insulin → resulting in gestational diabetes which reverses after pregnancy
- ↓ hPL → threatened abortion
  - IUGR

③ Progesterone:
- Supports & continues pregnancy (secretory endometrium)
- Production:
  - non-pregnant: corpus luteum
  - pregnant: placenta (after 10 week of gestation)

④ Estrogen:
- Estrone (E1) : Estradiol (E2) , Estriol (E3)
  - E1: After menopause from adipose tissue
  - E2: non-pregnant from follicles
  - E3: during pregnancy from placenta
- Estrogens are converted from androgens through aromatase enzymes.

- Changes in organs:

① Skin:
- Striae gravidarum (stretch marks) → it is genetic
- Increased vascularity (smooth muscle relaxing effect of progesterone)
  - Spider angiomata → ↑ estrogen, blanch when putting finger on it
  - Palmar erythema → ↑ blood flow to hands, to get rid of heat production from fetus which is transferred out through the mother
  - Chadwick sign
- ↑ pigmentation:
  - Linea nigra
  - Chloasma

② Cardiovascular:
- Arterial blood pressure:
  - ↓ systolic
  - ↓↓ diastolic
- Venous blood pressure: resulting in varicose veins & hemorrhoids
  - central: unchanged
  - femoral: ↑ (x 3)
- Peripheral vascular resistance: ↓
- Plasma volume: ↑ by 50% (from 5 L to 7.5 L)
- HR: ↑ ; SV: ↑ so cardiac output increases

all to enhance uteroplacental circulation.

- CO varies by maternal position:
  - supine: IVC get compressed by the enlarged uterus with ↓ cardiac return & ↓ CO
    "supine hypotensive disorder"
- CO varies by stage of labour (increasing)
- Heart murmurs → mid-systolic ejection murmur

③ Hematologic:
- RBC mass (↑ by 1/3)
- Plasma volume (↑ 50%) → ↓ Hb/hematocrit
- WBC count ↑ (from 10,000 to 16,000)
- ↑ Clotting factor (hypercoagulable state: 7, 8, 9 & 10)
- Platelet count is <u>unchanged</u>

④ GI tract:
- ↓ smooth muscle wall tone (due to progesterone) leading to ↓ motility (constipation)
  - resulting in ↑ emptying time & residual volume
    - ⇓
    - reflux esophagitis

⑤ Pulmonary:
- ↑ Tidal volume with ↓ → IRV, ERV, RV
- Respiratory rate does not change
- ↑ minute ventilation = RR X TV
- therefore PCO_2 ↓, pH ↑
  - ⇓
  - respiratory alkalosis
    - ⇓
    - ↑ urin pH
      - ⇓
      - UTIs !!

⑥ Renal:
- ↑ kidney size
- ↑ ureter size → stasis of urine → UTIs !!
- ↑ Renal pelvis volume
- ↑ RPF, GFR & creatinine clearance
  - ⇓
  - due to increased clearance the following parameters goe down
    - ⇓
    - BUN, serum creatinine, serum uric acid
- ↑ urine glucose → but doesn't make a diagnosis of diabetes
- urine protein doesn't change!

⑦ Endocrine:
- ↑ Blood flow to pituitary gland → enlarged → risk of Sheehan's syndrome with post-partum bleeding
- Adrenal glands size doesn't change but cortisol ↑
- ↑ Thyroid gland size with ↑ T3, T4 (total)
- Notice that TSH & TRH do not change!
- Free T3 & T4 do not change!

- Fetal circulation:
  - Utero Shunts:
    - Ductus venosus: from umbilical vein to IVC
    - Foramen ovale: right atrium to left atrium
    - Ductus arteriosus: pulmonary artery to descending aorta
      - endomethacin is given to close this duct if it is patent (pre-term labour).
  - HbF → ↑ O_2 binding capacity

Physiology of Lactation

- Breast Anatomy:
  - 15-20 LOBES: containing alveoli which produce milk
  - Ducts: carrying milk from alveoli to nipples
  - Most of breast is composed of fat (adipose tissue)
  - Cooper's ligament: supporting the breast & giving it its characteristic shape
- Breast hormones:
  - Estrogen: at time of puberty results in growth of → ducts, fat, Nipples
  - Progesterone: growth of lobules & alveoli
  - Prolactin: production of milk after delivery; estrogen level must be dropped
  - Oxytocin: released through suckling & results in contraction of myoepithelial cells in alveoli → ejection of milk.
- Breast development:
  - mammary bud → breast cord → breast alveoli & ductal system at time of puberty.
- 30%. ↑ size of breast in pregnancy → can result in pain!

Embryology & Fetology

- Post-conception events:
  1. Week-1 (ovulation to implantation)
     - egg released from ovaries; site of release forms corpus luteum
     - Ovulation usually at day 14 → fertilization within 24 hrs
       - zygote moving through fallopian tube & dividing to reach morula-state → reaches intrauterine cavity as a blastocyst → which will be implanted in uterine wall 5-6 days postconception
  2. Week-2 (formation of bilaminar germ disc):
     - Epiblast and hypoblast
     - Syncytiotrophoblasts will invade maternal sinusoids and β-hCG becomes detectable.
  3. Week-3 (trilaminar germs disc):
     - Epiblast → ectoderm
     - Hypoblast → endoderm
     - Between → mesoderm

[4] Weeks 4-8 (formation of major organ systems):
↳ Teratogenesis is possible (medications, radiation, hyperthermia)

- Development of female reproductive system:
  ↳ Paramesonephric (Mullerian) duct:
    ↳ Initially doubled → then, fusing to produce:
      ↳ Fallopian tubes
      ↳ Uterus
      ↳ Cervix
      ↳ Proximal vagina
    ↳ Differentiation of external genitalia depends on hormones → especially androgens in males
      ↳ Default differentiation in an embryo is toward female

- Mesonephric duct in males:

Sertoli cells → MIF → Inhibition of Mullerian duct

Leydig cells → testosterone → maintain mulleri an development
testosterone → 5α reductase to DHT for external genitalia

- Teratology:
  ↳ Teratogenic agent: disturbing normal development & affecting subsequent function. The effect of this agent is time-dependent → 3-8 week postconception (because all 3 germ layers are present)
  ↳ What are these agents:
    ↳ Radiation → > 10 rads!
    ↳ Chemotherapy → highest risk is in 1st trimester
    ↳ DES → T-shaped uterus & ↑ risk of clear-cell carcinoma
      ↳ Eearly delivery of baby
      ↳ Or failure of conception
    ↳ Phenytoin:
      ↳ Craniofacial dysmorphism
      ↳ Nail hypoplasia
    ↳ Isoretinoin: used by teenage female patients
      ↳ Resulting in microtia (small ear/malformation)
    ↳ Lithium: associated with Ebstein anomaly
    ↳ Tetracyclin: deciduous teeth discoloration
    ↳ Thalidomide: phecomelia (short limbs)
    ↳ Valproic acid: neural tube defect

Perinatal Statistics & terminology

- Terms:
  - Gravidity: total # of pregnancies regardless of duration or outcome
  - Parity: pregnancy ≥ 20 weeks
  - Loss of pregnancy:
    - < 20 weeks → abortion
    - 20 - 40 weeks → Fetal death → perinatal death
    - Live birth & death occurs at 1st month → neonatal death
    - Live birth & death occurs at 1st yr → infant death
- Maternal mortality causes:
  - Commonest → thromboembolism in USA
  - In developing countries → infections
    - Post-partum hemorrhage

Introduction to human genetics

- Indications for genetic counsling:
  - Advanced maternal age (> 35 yrs ⟹ Chromosomal anomalies increase)
  - Recurrent abortions (especially at 1st trimester) & family history
- Commonest cause of abortion is chromosomal abnormalities (especially trisomies).

Chromosomal Abnormalities

- Aneuploidy: numeric chromosomal abnormality in which cells don't contain two complete sets of 23 chromosomes (1 extra or less chromosome
  - Trisomy 13
  - Trisomy 18
  - Trisomy 21 (commonest)
- Polyploidy: cells contain complete extra sets of chromosomes
  - Triploidy (69, XXY) → 2 sperms + 1 egg (seen with partial mole)
- Mosaicism: two or more cytogenitically distinct cell lines in the same individual
  - 46, XX / 45, X
  - Resulting in:
    - premature ovarian failure (30's)
    - Gonadoblastoma of the ovary
- Genetics of pregnancy loss:

1. Turner's syndrome (45, X → 1:10,000)
   - 98% are spontaneosly aborted
   - Loss of paternal X-chromosome
   - short-stature, gonadal dysgenesis, limb edema, coarctation of aorta web-neck (residual of cystic hygroma), ↑ FSH (ovarian follicle failure)

[2] Klinefelter syndrome:
- 47, XXY → 1:2000 births
- has no prenatal ultrasound markers!
- Charac. by tall stature, central obesity, micropenis & small testicles → infertility

[3] Down syndrome:
- Trisomy 21 → 1:800
- Associated with endocardial cushion defects & duodenal atresia → double-bubble sign with polyhydramnios
- Risk significantly increases after age 40
- Can be detected by FISH
- Simian crease is found in 53%.

[4] Edward syndrome:
- Trisomy 18 → 1:8,000
- charac. by rocker bottom feet, clenched fist (40%.)

[5] Patau syndrome:
- Trisomy 13 → 1:6,000
- poor survival with profound mental retardation.
- charac. by: bilateral cleft lip & palate, a single-eye, holoprosencephaly (in ultrasound)

Mendelian Genetics

[1] Autosomal dominant:
- No skip of generations; no carriers; affecting both males & females
- Examples:
  - achondroplasia dwarfism (majority are neomutations)
  - Marfan syndrome
  - Polycystic kidney disease

[2] Autosomal recessive:
- skip generations; carriers (more than affected); consanguinity (↑risk) and affecting both males & females
- Both parents are carriers:
  - 25% not affected
  - 25% affected
  - 50% carriers
- Examples: SCD, cystic fibrosis & congenital adrenal hyperplasia

[3] X-linked recessive:
- skips generations; carriers are only females; affected are only males
- Examples: hemophilia & color blindness

[4] X-linked dominant (rare):
- no skip of generations; both males & females affected
  female to female/male, male to females only

Multifactorial Inheritance

- A number of genes can produce the same disorder (polygenic)
  - causing 70% of birth defects
  - Examples:
    - Neural Tube Defect (NTD) → developing at 26 - 28 days post-conc
    - Congenital heart disease
    - Cleft lip/ palate

how prevented

Preconception administration of folic acid ↓ which also reduces risk of congenital heart disease

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Chapter (2): Failed Pregnancy

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Induced Abortion

- Risk of abortion morbidity & mortality ↑ with advanced gestational age
- Mefipristone is a medical termination of 1st trimester pregnancy
- 1st trimester abortion - surgical:
  - Suction (D&C) < 13 weeks
    - Done in professional clinics : prophylactic antibiotics are given to reduce risk of infection, conscious (sedation to relieve pain)
    - Cervix is dilated with Hegar dilators or laminaria
    - Complications : endometritis & retained products of conception (POC)
- 1st trimester abortion - medical:
  - Oral mefipristone (progesterone antagonist)
    and
    oral misoprostol (cytotec) → PGE1 causing contractions of myometrium
  - The earlier the pregnancy, the higher the rate of successful abortion (within 63 days of amenorrhea)

- 2nd trimester - Dilation and Evacuation (D&E):
  - cervix dilated with osmotic laminaria
  - Fetus removed in pieces → US guidance ensures complete evacuation
    - This is done using forceps
  - Complications:
    - Immediate: uterine perforation, retained tissue, hemorrhage and infection
    - Delayed: cervical trauma with resulting cervical insufficiency
- 2nd trimester - labour induction:
  - Uterine contractions are stimulated to dilate the cervix
  - Used:
    - Prostaglandins (PGF_{2x})
    - Misoprostol (PGE1)
  - Complications:
    - Immediate: retained placenta (20% of cases!) → requiring curettage, hemorrhage & infection
    - Delayed: cervical trauma & cervical insufficiency

Spontaneous Abortion

- 1st trimester bleeding:
  1. Threatened abortion:
     - Cervical os closed
     - US: viable preg.
     - Management: observation
  2. Missed abortion (embryonic demise):
     - cervical os closed
     - US: non-viable preg.
     - Management:
       - Scheduled (D&C)
       - wait for normal passage of (POC)
       - Give misoprostol (PGE1)
  3. Inevitable abortion:
     - cervical os opened
     - US: deceleration of fetal heart
     - Management: emergency (D&C)
  4. Incomplete abortion:
     - Cervical os opened
     - US: POC some left
     - Management: emergency (D&C)
  5. Completed abortion:
     - cervical os opened
     - US: POC all gone/passed
     - Management: observation
- Causes of 1st trimester loss:
  - Aneuploidy (most common): turner syndrome (X); trisomy 16
  - Anticardiolipin antibody (uncommon): development of Ab against fetal or placental tissues
- Diagnosis of 1st trimester bleeding:
  - Transabdominal ultrasound
  - Transvaginal ultrasound
- Important lab test after performing 1st trimester (D&C)
  - Blood Rh status: if mother is Rh- ⟹ RhoGIAM will be given

Fetal Demise

- Diagnosis:
  - < 20 week: ↓ uterine size
  - ≥ 20 weeks: no fetal movement

  } This is based upon ultrasound
- Is DIC present?
  - ↓ platelets, ↓ fibrinogen → YES → management (immediate delivery):
    - < 20 weeks: D&E
    - > 20 weeks: PG

    ↑ D-dimer, PT & PTT
- Is the mother psychologically ready to empty the uterus?
  - NO → weekly DIC panels are required weekly
  - YES
    - Is there fetal anomoly? → autopsy needed → PGE2
      - NO → management
        - < 20 wks → D & E
        - > 20 wks → PG
- Cause of fetal demise → 50 % idiopathic

- Definition of fetal demise: death of fetus ≥ 20 wks to birth
- Complications:
  - DIC
  - GRIEF resolution
- Cause: idiopathic → but possible causes are:
  - Antiphospholipid syndrome (treatment is heparin with next pregnancy).
  - DM out of control
  - Severe isoimmunization (Rh-disease)
  - Fetal aneuploidy or fetal infections (TORCH)
- Psychosocially → when baby is delivered → let mother see, hold, name & bury, encourage talking and tears

Ectopic Pregnancy

- Definition: implantation of fertilized egg outside uterine cavity most commonly in distal part of fallopian tube (ampulla 78%)
- Characterized by:
  - Amenorrhea
  - Unilateral pain
  - Bleeding

  → if ↑ pulse; ↓ BP → ruptured ectopic → OT
  → if not ruptured:
    - β-hCG1 < 1500 → repeat in 2-3 days
    - β-hCG1 > 1500 & US shows no intrauterine gestational sac → unruptured ectopic
      - Management:
        - β-hCG1 < 6000: methotrex.
        - β-hCG1 > 6000: laparoscopy

- Differential diagnosis:
  - Threatened abortion
  - Incomplete abortion
  - Molar pregnancy

  how to differentiate? → Ultrasound, Speculum exam
- Risk factors of ectopic pregnancy:
  - Scarring or adhesions of the tube:
    - Infections: PID
    - Failed tubal ligation
    - Congenital
    - Idiopathic (common)
- Diagnosis of ectopic pregnancy:
  - Unruptured:
    - β-hCG1 ≥ 1500 mIU
    - Ultrasound: no intrauterine pregnancy! → normal endometrial strip
- Management of ectopic pregnancy:
  - Ruptured → urgent surgery to stop bleeding
  - There is intrauterine pregnancy → individualize management
  - Unruptured:
    - Medical (methotrexate): early ectopic; β-hCG1 < 6000 mIU
      follow-up with weekly β-hCG1 titer
    - Surgical (laparoscopy): late ectopic; β-hCG1 > 6000 mIU
      - Salpingostomy: preserving the tube
      - Salpingectomy: removing the tube

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Chapter (3): Obstetric Procedures

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Obstetrical Ultrasound

- Ultrasound:
  - Crown-Rump Length (CRL) is used in first trimester between 8-12 wks
    - Dating accuracy ± 5 days
  - When done 18-20 wks
    - Dating accuracy ± 7 days
  - It is relatively safe
  - 1st trimester screening test:
    - Nuchal translucency (between neck & skin); done at 10-14 wks
      - if present, this is a risk factor for:
        - Aneuploidy
        - Cardiac disease
  - 3D-Ultrasound is now available (Notice that resolution is less than 2D-US)

Chorionic Villous Sampling (CVS)

- Definition: aspiration of placental tissue precursors under ultrasound guidance (there is no entrance to amniotic cavity)
- Performed at 10-12 wks
- The procedure can be done:
  - Transvaginal
  - Transabdominal
- Pregnancy loss rate: 0.7%.
- Chromosomes of embryo & those of placenta should be identical because both are arising from the same origin (zygote)
- Abnormality found with CVS ⟶ must be confirmed with amniocentesis

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Amniocentesis

- Definition: transabdominal needle withdrawal of amniotic fluid under ultrasound guidance.
- Performed after 15 wks
- Fetal karyotyping performed on amniocytes floating in amniotic fluid (AF)
- You can check for AF-∝FP (which has a lower false-positive rate than maternal serum-∝FP)

⇓

if elevated

⇓

there is a neural tube defect

- Pregnancy loss rate: 0.5 %.

Percutaneous Umbilical Blood Sampling

- Definition: transabdominal needle aspiration of fetal umblical cord blood
  - ↳ Also known as cordocentesis
- Performed > 20 wks → with guidance of ultrasound & anesthesia
- Fetal blood is aspirated from umbilical vein.
- Why doing it?
  - ↳ Diagnostic → fetal blood gases, karyotype, IgG & IgM antibodies
  - ↳ Theraputic → intrauterine transfusion with fetal anemia
- Pregnancy loss rate: 1-2%. (higher than that of CVS & amniocentesis)

Fetoscopy

- Definition: transabdominal fiberoptic scope for intrauterine surgery
- Performed > 20 wks under general or local anesthesia
- Aids in taking fetal skin biopsy when suspecting fetal icthyosis
  - ⇓ it is an inherited disease which is lethal
- Risks of procedure:
  - ↳ Bleeding
  - ↳ Infection
  - ↳ Membrane rupture
  - ↳ Fetal loss (2-5%)

Cervical Cerclage

- Definition: transvaginal procedure performed between 14-20 weeks (2nd trimester) under general anesthesia in operating room.
- Indication: cervical insufficiency (painless dilation of cervix → delivering non-viable fetus)
- A suture is placed in the cervix & circuling cervical canal to keep it from dilating
- Risks: bleeding, infection, membrane rupture & fetal loss (if cervix is already dilated).
- Types:
  - ↳ McDonald → suture removed around 36-37 wks → vaginal deli.
  - ↳ Shirodkar → cesarean delivery

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Chapter (4): Prenatal Management of The Normal Pregnancy

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Diagnosis of pregnancy

- Diagnosis:
  - β-hCG (but it can be elevated with ovarian tumors)
  - Fetal heart through Doppler stethoscope
  - Ultrasound (better)
    - Determining gestational age
    - How many fetuses there are
    - Presence of intrauterine gestational sac
- Assessing gestational age:
  - Menstrual history (LMP)
  - Eearly ultrasound
- Signs of pregnancy:
  - Presumptive (unrelated to uterus or fetus):
    - Amenorrhea (most common)
    - Breast tenderness
    - Nausea & vomiting
  - Probable (related to changes in uterus or mother's feelings):
    - ↑ uterine size
    - ↑ β-hCG
  - Definitive (related to fetus):
    - Ultrasound of fetus → crown-Rump length → in 1st trimester
    - Fetal heart tones → 2nd trimester → BPD, HC, AC & FL

Establishing Gestational Age

- Pregnancy dating methods:
  - Conceptional → 38 weeks
  - * Menstrual → 40 weeks from LMP (assuming cycle is 28 days)
  - Naegle's rule → LMP − 3 months + 7 days
- Identifying Basal Body Temperature:
  - Thermogenic effect of progesteron (↑ 0.5°)
- Menstrual history:
  - Define LMP (Is she sure about it?)
  - Normal menstrual cycle (28 cycle?)
  - Planned pregnancy → varying from 21 − 35 days
- In menstrual cycle:
  - Post-ovulatory phase is constant (14 days)
  - Pre-ovulatory phase is variable (1-3 wks)
- Quickening:
  - Multigravida: 16-18 wks
  - Primigravida: 18-20 wks
- Fundal height:
  - Accurate after 20 wks (1cm → for 1 gest wk)
    - at level of umbilicus

Identification of Risk Factors

- Risk factors (simply obtained from history taking):
  - Obstetric: term? placenta previa? bleeding? vaginal delivery --etc
  - Medical: hypertension? diabetes? cardiac disease? thyroid disease --etc
  - Surgical: previous abdominal surgery which can result in scarring
  - Social: living where? income?
  - Family: Genetic diseases? mental retardation? birth defects
  - Sexual: HIV-screening, gonorrhea, chlamidya, syphilis, sexual partners --
  - Lifestyle: smoking, alcohol --etc
  - Teratogens: medications? x-ray? --etc
- Follow-up:
  - q 4 wks < 28 wk
  - q 2 wks 28-36 wks
  - q 1 wk > 36 wk

Normal Pregnancy Events

- Trimesters: (39 wks divided by 3):
  - 1st trimester: 1-13 wks
  - 2nd trimester: 14-26 wks
  - 3rd trimester: 27-39 wks
- 1st trimester:
  - Nausea & vomiting → due to ↑ β-hCG
  - Fatigue, not feeling well
  - Bleeding: most will survive
  - 2.25-5 kg weight gain
  - Risk of spontaneous abortion (especially due to aneuploidy)
- 2nd trimester:
  - Nausea & vomiting gone } Feeling of well-being
  - Fatigue is less
  - Braxton-Hicks contractions → ↓ frequency; ↑ duration contractions not causing any changes to the cervix
  - Quickening (maternal perception of fetal movement)
  - Weight gain → 0.5 kg/wk (entire pregnancy = 12-13 kg)
  - Complications are few
- 3rd trimester:
  - Feeling uncomfortable
  - Lightening: less pressure on diaphragm due to engagement of fetus but more pelvic pressure is felt
  - Bloody show → release of bloody cervical mucus due to cervical dilation
  - Weight gain → 0.5 kg/wk
  - Majority of pregnancy complications: Premature rupture of membranes, preterm labour, pregnancy induced hypertension, UTI & GDM

Normal Pregnancy Complaints

- Backache:
  - Common in 3rd trimester
  - Due to lordosis (adjusting for heavy uterus)
  - management: correct posture
- Bleeding gums:
  - Increase blood flow by estrogen
  - Conservative management
- Breast enlargement:
  - Support bra
- Carpal tunnel syndrome:
  - Wrist splint
- Complexion changes:
  - Chloasma & pigmentation
- Dizzyness & fainting:
  - Due to normal ↓ is systolic & diastolic blood pressure
  - Avoid rapid postural changes
- Fluid retention:
  - ↓ albumin → loss of fluid from blood vessels into interstitium
  - Elevate legs
- Hair & nails:
  - ↓ normal loss of hair (which will start falling after pregnancy is terminated)
- Headaches:
  - Ice packs
  - ↑ energy snacks
- Leg cramps:
  - Ca^{2+} supplementation
- Morning sickness:
  - small meals
  - Antacids
- Nose bleeds:
  - ↑ estrogen → dilation of blood vessels in the nose
  - Avoid nasal sprays
- Stretch marks:
  - Genetic!
  - Conservative management
- Stress incontinence:
  - Towards end of pregnancy due to pressure on uterus
  - Kegel exercises
- Varicose veins:
  - ↑ femoral venous pressure
  - Avoid standing for a long time.

Safe & Unsafe Immunizations

- Safe immunizations → killed or inactivated viruses
  - → Influenza (in flu season)
  - → Hepatitis A & B (pre & post exposure)
  - → Pneumococcus (only for high risk women → not given routinely)
  - → Meningococcus (in unusual outbreaks → not given routinely)
  - → Typhoid (traveling to areas where typhoid is endemic
- Unsafe immunizations → live attenuated
  - → MMR → Measles, Mumps, Rubella
  - → Polio
  - → Yellow fever
  - → Varicella

There are few datas available indicating adverse impacts of these vaccines

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Chapter (5): Prenatal Laboratory Testing

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1st Trimester Lab Tests

Maternal Benefit	Fetal Benefit	Immunization
* CBC → to assess for anemia		* Rubella IgG: to check if mother is protected against rubella → if not → she will receive immunization after delivery
cervical culture for Gonorrhea & Chlamydia		* HBsAg → if ⊕ → mother is asymptomatic carrier → baby is immunized after delivery
* Urine screen → looking for asymptomatic bacteruria (8% of cases)	* Atypical Antibody Test: to identify presence of antibodies against foreign RBCs in maternal blood-stream	* Type of Rh → if mother is Rh ⊖ she will be immunized at 28 wks with RhoGIMM & after delivery if the baby is found to Rh ⊕
* Pap smear → to identify pre-cancerous cervical changes (dysplasia)	* VDRL: a screening test for syphilis → mostly will be detected as latent syphilis (with no impact on mother's body)	
	* HIV → ELISA confirmed with Western Blot test	
	* GDM → heavy baby	

- Tuberculosis screening:
  - Skin (tine) test
    - ⊕ → Chest x-ray
      - ⊕ → sputum culture & triple therapy ⇓ streptomycin, para-aminosalicylic acid & isoniazid
      - ⊖ → isoniazid + B_6 (for 9 months)

2nd Trimester Lab tests

- Maternal serum α-FP (15-20 wks):
  - High (what are the possibilities?) ⟹ Low → trisomy 21 (Down Syndrome) is suspected → confirmed with ultrasound or amniocent. for karyotyping
    - Dating error (15-30%.)
    - Twins (1%.)
    - Neral Tube Defect (NTD)
    - Ventral Wall Defect (VWD)

    → confirmed with ultrasound
    - if cause is still not identified → amniocentetis for amniotic fluid α-FP

- Types of NTDs:
  - Spina bifida occulta
  - Meningocele
  - Meningomyelocele
- Types of VWDs:
  - Gastroschisis → intestine protruding, not covered by membranes, insertion of umbilical cord is adjacent to the defect
  - Omphalocele → intestine protruding, covered by a membrane, insertion of umbilical cord is on the distal end of omphalocele sac

3rd Trimester Lab Tests

- 1 hour 50g OGTT (24 - 28 wks): screening for GDM
- CBC → anemia
- Atypical antibody screen
- Group-B streptococcus vaginal culture (36 wks): prophylactic penecillin required at labour

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Chapter (6): Late Pregnancy Bleeding

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Late Pregnancy Bleeding

- Differential Diagnosis:

P: painful bleeding
PL: painless bleeding

[P] → Abruptio placenta (1% of pregnancies)
[PL] → Placenta previa (0.5% of pregnancies at term)
[PL] → Vasa previa
[P] → Uterine rupture
} These are rare causes

- Late pregnancy bleeding could be due to the following causes:
  - Cervical causes:
    - Erosion: epithelium is gone, stroma with vessels are exposed
    - Polyps
    - Cancer: assessed with speculum exam (but make sure before to rule-out placenta previa)
  - Vaginal causes:
    - Varicosities
    - Lacerations
  - Placental causes:
    - Abruptio placenta
    - Placenta previa
    - Vasa previa
- What to do with late preg. bleeding?
  - Initial evaluation:
    - Maternal status: check vital signs (no hypotension/tachycardia?)
    - Fetus status: CTG
  - Initial management:
    - Large bore IV (especially with sever bleeding)
    - Foley's catheter
  - Initial investigations (when mother's condition & fetus are stable)
    - CBC
    - DIC labs → abruptio placenta is the main cause of obstetrical DIC
    - Ultrasound
    - Type & cross-match (T&X)

↓ platelets, ↑ PT/PTT, ↓ fibrinogen
↑ D-dimer, schistocytes are seen on blood film

Abruptio Placenta

- Character of bleeding: painful
- Types of bleeding:
  - Overt: blood is coming out of the vagina
  - Concealed: blood is captured behind a placental hematoma
- Placental location: normal/not in lower segment such as placenta previa
  - Thus abruptio placenta is identified as a premature separation of a normally implanted placenta
- There is a high risk of DIC with abruptio placenta
- What are the risk factors?
  - Previous abruption
  - Hypetension
  - Maternal blunt trauma
  - Cocaine
- Management:
  - Emergency cesarean: maternal or fetal jeopardy (hypotension, tachycardia or fetal heart decceleration)
  - Vaginal delivery: mother & fetus are stable, term, in labour
  - Conservative in hospital: mother & fetus are stable, pre-term, uterine contractions stopped

---

Placenta Previa

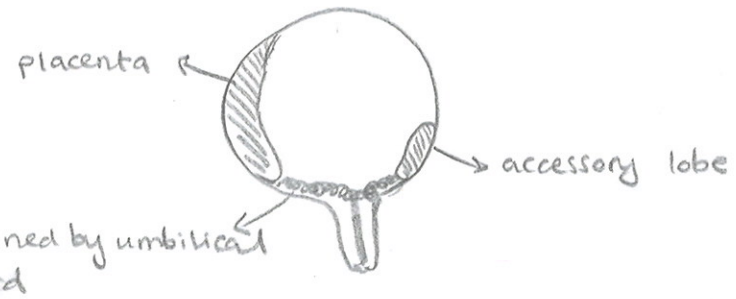
- Character of bleeding: painless
- Characteristics:
  - Lower segment placental implantation → 16 wks: 20%. → 40 wks: 0.5%. } due to tropho tropism (placental migration)
  - Transverse fetal lie
  - no uterine contractions (relaxed)
  - Confirmed by ultrasound
- Pathophysiology of bleeding:
  - As lower uterine segment stretches → there will be avulsion of anchoring villi
- Types:
  - Grade-I → marginal (close to cervical os)
  - Grade-II → partial (partially covering cervical os)
  - Grade-III → total central/complete (completely covering cervical os)
- Risk factors:
  - Multiple pregnancy
  - Previous placenta previa
  - IVF
- Management: cesarean section

Placenta Accreta/ Percreta/ Increta

- If placenta previa occurs over a previous uterine scar, the villi may invade beyond Nitabuch layer resulting in placenta accreta
- Abnormal placentation:
  - Accreta: invading deep basalis layer
  - Increta: invading partial myometrium
  - Percreta: invading serosa/ bladder

Vasa Previa

- Classical triad:
  - Artificial rupture of membranes (or it can be spontaneous)
  - followed by → vaginal bleeding
  - followed by bradycardia of fetus while mother's vital signs are normal



- Fetal blood volume = 100 ml/kg → term (3 kg) = 300 ml
  - ⇓
  - 200 ml are lost with vasa previa → baby will die.
- Character of bleeding: painless
- Placental location: normal
- Risk factors:
  - Velamentous insertion of umbilical cord
  - Accessory placental lobe
  - Multiple pregnancy
- Management → crash cesarean!

Uterine Rupture

Complete laceration of uterine wall

- Character of bleeding: painful
- (X10) with classical uterine incision
- Other features:
  - Abdominal pain
  - Profuse vaginal bleeding
  - Fetal bradycardia
  - No uterine contraction
  - fetal head is floating instead of descending
- Diagnostic triad:
  - Painful bleeding
  - Lost fetal heart tones
  - Loss of station
- Management: get fetus out (usually dead!); repair uterus (hysterectomy: non-stopping bld.)

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Chapter (8): Obstetric Complications

Prepared by: Ali Jassim Alhashli

Cervical Insufficiency

- Characteristics:
  - Pelvic pressure with vaginal discharge
  - No uterine contractions
  - Membranes bulging from cervix
  - Effacement of cervix (< 25 mm) & dilation (normaly, cervical length = 50mm)
- Causes:
  - Trauma: rapid forceful cervical dilation associated with 2nd trimester abortion
  - Cervical laceration: from rapid delivery
  - Injury from cervical cone (because of cervical dysplasia)
  - Congenital weakness (due to DES exposure)
- Diagnosis:
  1. History:
     - ≥ 2 unexplained 2nd trimester pregnancy losses
  2. Characteristics mentioned above
- Management:
  - Cervical cerclage placed at 13-16 wks
  - Removed at 36-37 wks
- Types:
  - McDonald's → removable
    - normal delivery
  - Shirodkar's → suture is left in its place
    - CS

Multiple Gestation

- Diagnosis:
  - ↑ fundal height → not corresponding to gestational age
  - ↑ β-hCG → Exag. vomiting
  - ↑ α-FP

  } confirmation with ultrasound
- Genders:
  - Different: dizygotic, diamnionic, dichorionic (lowest risk)
  - Same:
    - Monozygotic, diamnionic, dichorionic (separation = 0-3 days)
      risks: anemia, pre-eclampsia, 50% CS and post-partum hemorrhage
    - Monozygotic, diamnionic, monochorionic (separation = 0-8 days)
      risks: twin-twin transfusion syndrome (≥ 25% size discordance)
    - Monozygotic, monoamnionic, monochorionic (separation = 9-12 days)
      risks: cords entangled

      ⇓ separation after 13 days results in conjoined twins
- Methods of delivery:
  - Both cephalic → vaginal delivery
  - 1st non-cephalic → CS

- Risks of cerebral palsy:
  - Twins = 1.5 %.
  - Triplets = 8 %.
  - Quadruplets = 43 %.
- What is commonest?
  - Dizygotic twins = 2 sperms + 2 eggs
  - Risk factor: ovulation induction
  - Diagnosis: ultrasound

⇓ other risk factors:
- IVF
- Family history
- Race (↑ in Africans)

- Complications:
  - Ante-partum:
    - Anemia (iron & folate supp)
    - Pre-eclampsia (x3 ↑)
  - Intrapartum:
    - Pre-term labour (50 %.)
    - Malpresentation (50 %.)
    - CS (50 %.)
  - Post-partum:
    - Hemorrhage → uterine atony → from overdistended uterus
- Monochorionic & one of twins dies!:
  - Twin embolization syndrome

Isoimmunization

- Definition: antibodies directed against foreign RBC surface antigens, often those of her fetus.
- The baby will become anemic & if not adequately treated → hydrops fetalis
- Most common cause: feto-maternal bleeding
- Most common RBC antigen: Big "D"
- Most common screening test: indirect Coomb's test (Atypical Antibody Test)
- Neonatal outcome:
  - Mild jaundice
  - Erythroblastosis fetalis
- Risk factors for isoimmunization:
  - Amniocentesis
  - Ectopic pregnancy
  - Placental abruption
  - Placenta previa
  - D&C
- Negative mother; positive fetus (because father is positive)
  - First pregnancy: no problem (but antibodies will be developed)
  - Second pregnancy: antibodies attacking fetus → hydrops
- How to assess anemia in fetus:
  - Amniocentesis → for amniotic fluid bilirubin
  - PUBC → for fetal hematocrit (< 25 % → risk!)
  - Ultrasound → Middle Cerebral Artery (MCA) peak systolic velocity

- Intervention:
  - Intra-Uterine Transfusion (IUT)
  - If > 34 wks → deliver the baby!
- RhoGAM prevention:
  - Mechanism:
    - Passive anti-D IgG1 antibodies
    - Lysis of D⊕ RBCs before lymphocytes are activated
  - When to give it?
    - 28 (prophylactic): if mom is Rh⊖
    - After delivery: if mom is Rh⊖ & baby is Rh⊕ (second dose)

Pre-term Labor

- Incidence → 1:8 babies are delivered prematurly.
- ≥ 3 criteria for preterm:
  - Uterine contractions: 3 in 30 min
  - Weeks: 20-35 (<20 wks → abortion!)
  - Cervical change (dilation ≥ 2 cm)
- To stop preterm labor → tocolytics are given (delaying it 48 hours)
  - Betamethasone → ↑surfactant if < 34 wks
  - $MgSO_4$ → respiratory depression & pulmonary edema (reversed with Ca^{2+} gluconate)
  - β adrenergic agonists → hyperglycemia, hypokalemia, tachycardia & arrhythmia
  - PG1 synthesis-inhibitor → oligohydramnios, intrauterine closure of DA
  - Ca^{2+} channel blocker → myocardial depression
- With preterm labour we should always find if mother is Group-B streptococcus ⊕ → administer IV penicillin G1 to prevent sepsis
- Differential diagnosis for uterine contractions:
  - Uterine irritability → low intensity; high frequency contractions
  - Braxton-Hicks contractions → 1 contraction lasting 4 minutes!
  - Pre-term contractions → 3 in 30 minutes but cervix < 2cm dilated
  - Pre-term labour
- Risk factors for pre-term birth:
  - 50% multiple gestation
  - 50% with uterine anomalies
  - 25% with previous history
  - Infections are also responsible for pre-term births
  - Cervical incompetence
- Symptoms of pre-term labour:
  - low abdominal pressure or back pain
  - ↑ vaginal discharge
- Contraindications to tocolytics:
  - Obstetric: sever abruption, ruptured membranes, chorioamnionitis
  - Fetal: lethal anomaly, fetal demise, fetal jeopardy
  - Maternal: severe pre-eclampsia, eclampsia, advanced dilation

Pre-mature Rupture of Membranes (PROM)

- Definition: rupture of membranes before onset of labour
- Diagnosis: speculum exam
  - Pooling ⊕
  - Nitrazine ⊕
  - Ferning ⊕

- If she is in labour → there are uterine contractions → don't stop it!
- If she is not in labour → abnormal CTG → deliver!
- Criteria for chorioamn. → PROM
  - Fever
  - No UTI or upper respiratory inf.

  } given antibiotics (clindamycin & ampicillin) Deliver!
- Risk factors for PROM:
  - Ascending infection → production of PG → lysis of membranes
  - Congenital weakness of membranes
  - Smoking
  - Multiple gestation
- Clinical presentation of PROM:
  - Sudden gush of clear vaginal fluid
  - Ultrasound: oligohydramnios
- Management:
  - Presence of uterine contractions → deliver.
  - Chorioamn. → culture, IV antibiotics & deliver
  - No contractions but abnormal CTG → deliver
  - No contractions & normal CTG
    - Previability (< 24 wks) → induction or bed rest (coming if contractions or fever)
    - Preterm (24 - 35 wks) → hospitalize; steroids; cervical culture & 7 days of ampicillin & erythromycin
    - Term (> 36 wks) → deliver

Post-term Pregnancy

- Definition: ≥ 42 wks → ↑perinatal mortality
- Fetal effects:
  - Macrosomia (80%) → when placenta is maintained
  - Dysmaturity (20%) → when placenta deteriorates
- Management:
  - Dates sure; favorable cervix → induce labour with IV oxytocin
  - Dates sure; unfavorable cervix → induce labour with PGE_2
  - Dates unsure → conservative
- There is meconium aspiration risk

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Chapter (9): Hypertensive Complications

Prepared by: Ali Jassim Alhashli

Overview of Hypertension In Pregnancy

- In pregnancy, BP ↓ → Systolic ↓
  → diastolic ↓↓
- Hypertension = >140/90 mmHg → resulting in placental insufficiency

Gestational hypertension

- Definition: ↑ BP with no proteinuria > 20 wks of gestation
- Symptoms: none
- Physical exam findings: none
- Gestational HTN → normalizes post-partum → transient HTN
  → remains ↑ postpartum → new onset of chronic HTN

Mild Pre-eclampsia

- Criteria → gestation > 20 wks
  → Sustained HTN (>140/90)
  → Proteinuria (≥ 300 mg/24 hrs)
  } no symptoms ; no findings
- Risk factors for pre-eclampsia:
  - Demographic:
    - Nulliparа (most significant)
    - Age extremes (<20 yrs, >35 yrs)
  - Obstetric:
    - Multiple gestation
    - Molar pregnancy
    - Non-immune hydrops
  - Medical:
    - DM
    - Chronic HTN
    - Renal disease
    - SLE

    } "small-vessel disease" resulting in capillary injury and leakage of fluid
- Management:
  - < 36 wks → conservative
  - ≥ 36 wks → MgSO4 & delivery
    - Continued 24 hrs post-partum

Sever Pre-eclampsia

- Criteria:
  - BP ≥ 160/110
  - Proteinuria ≥ 5 grams / 24 hrs
  - Symptoms:
    - Headache
    - Visual disturbances
    - Epigastric pain
- Laboratory investigations:
  - DIC: ↓ platelets, ↑ PT/PTT, ↑ D-dimer, schistocytes
  - ↑ liver enzymes
- Management: aggressive
  - IV $MgSO_4$: preventing convulsions; continued 24 hrs post-partum
  - ↓ BP: hydralazine or labetalol
  - Induce labour (if mother & fetus are stable)

Eclampsia

- Pathophysiology: cerebral vasospasm, ischemia & edema
  - Resulting in tonic-clonic seizures
- Management:
  - $MgSO_4$: to stop convulsions; continued 24 hrs post-partum
  - ↓ BP: hydralazine or labetalol
  - Prompt delivery (at any gestational age): we don't want to lose the mother

---

Chronic HTN ± Superimposed Pre-eclampsia

- Chronic HTN: ↑ BP prior to onset of pregnancy
  - or
  - < 20 wks of gestation
- Criteria for Chronic HTN:
  - Gestational weeks < 20
  - Sustained HTN (>140/90)
  - ± Proteinuria
- Chronic HTN pregnancy prognosis:
  - Good → BP: 140/90 - 179/109
    - No end-organ damage
  - Poor → Renal disease (creatinine > 1.4 mg/dL)
    - Retinopathy
    - Left Ventricular Hypertrophy
  - Worst → Uncontrolled BP (250/140)
    - Chronic HTN + superimposed pre-eclampsia

- Management of chronic HTN:
  - Antihypertensive meds: methyldopa (DOC) or labetalol
  - Serial US → to detect ↑ risk of IUGR
  - Serial BP & urine protein
    - If superimposed by pre-eclampsia → delivery!
  - Induce labour with chronic HTN at term
- HTN medications not used in preg.
  - ACE inhibitors → fetal renal failure
  - Diuretics → ↓ plasma volume → resulting in placental insufficiency
- Management of chronic HTN + superimposed pre-eclampsia:
  - IV $MgSO_4$: to stop convulsions
  - ↓ BP: hydralazine or labetalol
  - Induce labour (regardless of gestational age)

HELLP Syndrome

- [H] → Hemolysis
- [EL] → Elivated Liver enzymes
- [LP] → Low Platelets

- Management:
  - IV $MgSO_4$: preventing convulsions
  - ↓ BP: hydralazine, labetalol
  - Inductions of labour
  - * Maternal steroids → to normalize lab values
- HELLP syndrome → 20 % incidence of placental abruption

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Chapter (11): Disproportionate Fetal Growth

Prepared by: Ali Jassim Alhashli

Intra-Uterine Growth Restriction (IUGR)

- Definition: fetus with estimated fetal weight < 10th percentile for corresponding gestational age.

- Causes:
  - Fetal (symmetric IUGR):
    - Aneuploidy (T21, T18, T13)
    - Infections (TORCH)
    - Structural anomalies (Congenital Heart Disease, Neural Tube Defect ... etc)
  - Placental (asymmetric IUGR):
    - Infarction
    - Abruption
    - Twin-Twin Transfusion Syndrome
    - Velamentous cord insertion
  - Maternal (asymmetric IUGR
    - HTN
    - Malnutrition
    - Smoking ± alcohol
    - Street drugs

- IUGR types:
  - Symmetric:
    - All ultrasound parameters (HC, BPD, AC, FL) are smaller than expected
    - Workup:
      - Detailed ultrasound
      - Amniocentesis for Karyotype
      - Assess for fetal infections
  - Asymmetric:
    - Head sparing but abdomen is small
    - Etiology: ↓ placental perfusion
    - AFI ↓
    - Monitoring:
      - Serial ultrasounds
      - NST
      - * AFI
      - * Umbilical artery dopplers

Macrosomia

- Definition: fetus with estimated fetal weight > 95th percentile for corresponding gestational age.
- Utrasound is poor in estimating fetal weight (±400 grams)
- Risk factors for macrosomia:
  - GDM.
  - Post-term pregnancy
  - Big mama (↑ BMI)
  - ↑ pregnancy weight gain
  - Multiparity
  - Male fetus
- Hazards:
  - Maternal:
    - Operative vaginal delivery
    - Perineal lacerations
    - Post partum hemorrhage (due to overdistended uterus)
    - Pelvic floor injury
    - Emergency CS
  - Fetal:
    - Shoulder dystocia
    - Birth injury
    - Asphyxia الاختناق بسبب فقدان الأكسجين
  - Neonatal:
    - Hypoglycemia
    - Erb palsy
- Management:
  - Elective CS:
    - EFW > 4500 in diabetic mom
    - EFW > 5000 in non-diabetic mom

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Chapter (12): Antepartum Fetal Testing

Prepared by: Ali Jassim Alhashli

Overview of Antepartum Fetal Testing

- Antepartum fetal testing should not begin until age of fetal viability (24 wks → when alveoli start to be formed in lungs)
- Testing:
  - Non-Stress Test (NST)
    - If reactive → only repeated as needed
    - If non-reactive → Vibro-Acoustic Stimulation (VAS)
      - If reactive → repeat as needed
      - If non-reactive → Bio-Physical Profile (BPP)
        - 8-10 → excellent
        - 0-2 → delivery!
        - 4-6
          - Contraction-Stress Test (CST)
            - (−) repeat as needed
            - (+) delivery
- Counting fetal movements (neither sensitive nor specific):
  - Time required for 10 fetal movements
- If mother present with:
  - ↓ fetal movements → start with NST
  - NO fetal movements → Directly go to ultrasound

Non-Stress Test (NST)

- NST = accelerations (response of fetal heart to fetal movement)
  - ↑ Fetal Heart Rate (FHR) ≥ 15 beats/min for ≥ 15 sec (15X15)
  - Before 30 wks → it is (10X10)
- Pre-requisites for NST:
  - Healthy, moving fetus
  - ≥ 30 wks gestation
- Interpretations of NST:
  - If accelerations are seen → reactive NST
  - If accelerations are not seen → non-reactive NST

Amniotic Fluid Index (AFI)

- Source of amniotic fluid:
  - Fetal urine (800-1200 ml) → then, it is swallowed again (recycled)
- Uterus will be divided into 4 quadrants → deepest pocket of amniotic fluid is measured in each quadrant
  - 4-quadrant AFI values:
    - Normal: 9-25 cm
    - Borderline: 5-8 cm
    - * > 25 cm → polyhydramnios
    - * < 5 cm → oligohydramnios

Biophysical Profile (BPP)

- BPP has 5 components:
  - NST → measured with CTG
  - Amniotic fluid volume
  - Fetal breathing movements
  - Fetal body movements
  - Fetal extremity tone

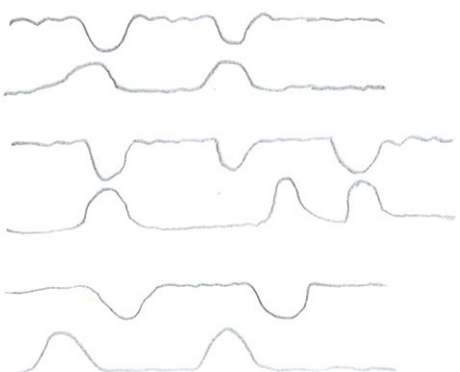
  } Assesed using ultrasound

- Management of BPP by score:
  - 8 - 10 → reassuring (repeat as needed)
  - 4 - 6 → Do Contraction-Stress Test (CST)
  - 0 - 2 → Prompt delivery !
- Modified BPP has only 2 components:
  - NST → indicator of current placental function
  - Amniotic fluid volume → indicator of long-term placental function

---

Contraction-Stress Test (CST)

- CST = oxytocin challange test = stressing the fetus by decreasing intervillous blood flow in the placenta
- CST = late decelerations
- CST:
  - Based on → ↓ intervillous flow with uterine contractions
  - Pre-requisites → you must have adequate stress (≥ 3 contractions in 10 min)
  - Contraindicated → wherever uterine contractions are inappropriate
    - Previous classical uterine incision
    - Pre-mature rupture of membranes
    - Cervical incompetence
    - Placenta previa
- Interpretation:
  - No late decelerations → ⊖ CST → reassuring (repeat as needed)
  - late decelerations → ⊕ CST → prompt delivery (usually CS)
- There are 3 types of decelerations:
  - Eearly decelerations
  - Variable decelerations
  - Late decelerations



Umbilical Artery Doppler

- Based on: measurment of diastolic blood flow
  - Normally;
    - ↓ Resistance
    - ↑ diastolic flow
- Indication: IUGR fetuses
- Non-reassuring criteria:
  - Absent diastolic flow ⟶ indicating significant vasoconstriction
  - Reversed diastolic flow

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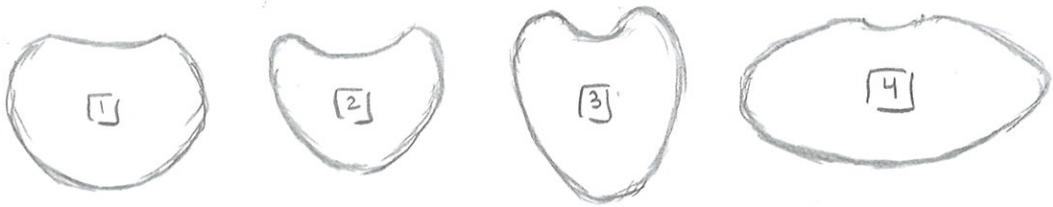
Chapter (13): Fetal Orientation In Utero

Prepared by: Ali Jassim Alhashli

Anatomy of Bony Pelvis

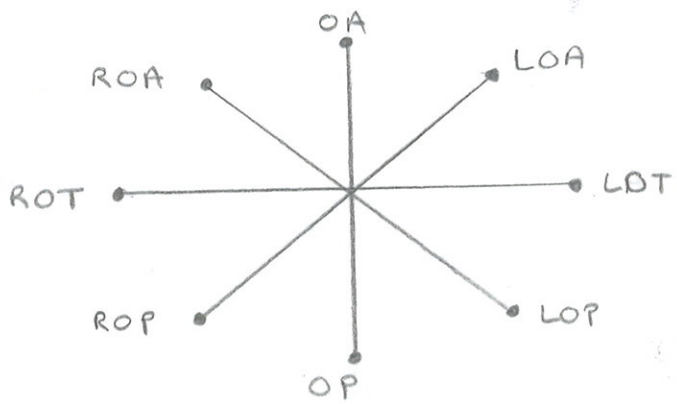
- There are 4 bones:
  - Ileum
  - Ischium
  - Pubis
  - Sacrum coccyx
- Joints of pelvis:
  - Sacroiliac
  - Symphysis pubis
  - Sacrococcygeal
- Landmarks of pelvis:
  - Linea terminalis
  - False pelvis
  - True pelvis
- Four types of pelvic shapes

1. Gynecoid: 50% of women (good pelvis for delivering babies)
2. Android: 30% of women (typical male pelvis - heart shaped)
3. Anthropoid: 20% of women (predisposes to occiput posterior position)
4. Platypelloid: predisposes to occiput transverse (rare)



Orientation in Utero

- Important terminologies:
  - Fetal lie: orientation of long axis of fetus and long axis of uterus
    - most common → longitudinal
  - Presentation: portion of fetus overlying pelvic inlet
    - most common → cephalic
    - There are 4 types of breech presentation
      - Single footling
      - Frank breech → possibility of vaginal delivery
      - Complete breech
      - Star-gazing breech → no VD because head is hyper-extended
  - Position: relationship of definite fetal part to maternal body pelvis
    - at delivery → occiput is anterior



- Attitude: degree of extension and flexion of fetal head
  - Most common → head flexed; chin to chest → "vertex"
- Station: expression of degree of descent of the presenting part through birth canal (expressed in cm above or below maternal ischial spine).

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Chapter (14): Normal and Abnormal Labor

Prepared by: Ali Jassim Alhashli

Overview of Labour

- Uterine changes:
  - During pregnancy, there is hypertrophy (↑ 20X in size)
  - During pregnancy, weight of uterus ↑ from 60g to 1000g!
  - Divided into:
    - Upper segment: contractile thick part
    - Lower segment: non-contractile thin part
  - Most of uterus is smooth muscle; while most of cervix is collagen
- Physiology of labour:
  - Cervical softening and effacement "Nose changes to lips"
- Cardinal movements of labour:
  - Engagement → descent of head through pelvis with flexion
  - Internal rotation
  - Extension
  - External rotation
  - Expulsion

Stages of Labour

- Stages of labour:
  - Stage I:
    - Latent phase: effacement → < 20 hrs in primipara, < 14 hrs in multipara
    - Active phase: dilation → 1cm/hr in primipara, 1.5cm/hr in multipara
  - Stage II: descent → < 2 hrs in primipara, < 1 hr in multipara
  - Stage III: expulsion & delivery of placenta → < 30 min
    - uterine contractions shear the anchoring villi from attachment to endometrial decidual bed
    - Characterized by lengthening of umbilical cord & gush of blood

---

Conduct of Normal Spontaneous Labour

- Preadmission:
  - Not admitted until ≥ 3 cm dilation unless PROM has occurred
  - Confirm cephalic presentation
- Admission:
  - Start IV line; clear fluids orally
  - maternal position as comfortable
  - Lateral recumbent encouraged
- Stag-I → continuous fetal monitoring of fetal heart rate
  - → Labor progress by vaginal exams
  - → Amniotomy; analgesia
- Stage-II → maternal pushing with contractions
  - → Episiotomy (only if indicated!)
- Stage-III → Spontaneous placental separation
  - → IV oxytocin to contract uterus
- Recovery period → observe 2 hrs for post-partum hemorrhage & pre-eclampsia

Abnormal Labour

- Definition: duration of any stage/phase of labour is prolonged
- Stage - I:
  - cervix dilation in multipara is more rapid than primipara (1.5cm/hr compared to 1 cm/hr)
- Prolonged latent phase (effacement):
  - Diagnosis:
    - Cervical dilation < 3 cm
    - > 20 hrs in primipara
    - > 14 hrs in multipara
  - Cause:
    - Injudicious analgesia
    - hypotonic uterine contractions: every 10 min instead of 3 min
    - hypertonic uterine contractions: frequent & intense but only lasting 20s!
  - Management:
    - Therapeutic rest (sedation)
- Prolonged / Arrested active phase (cervical dilation):
  - Diagnosis:
    - Cervical dilation ≥ 3 cm
    - Inadequate cervical change:
      - < 1.5 cm/hr in multipara
      - < 1 cm/hr in primipara
    - No cervical change ≥ 2 hrs (arrest!)
  - Causes:
    - Passenger (fetus): fetal size or orientation
    - Pelvis: mother's body pelvis
    - Power (uterine contractions)
      - Criteria:
        - Every 3 minutes
        - Lasting 45-60 s
        - 50 mmHg in intensity
  - Management:
    - IV oxytocin if uterine contractions are hypotonic + AROM
    - CS if UC are adequate but there is still no progress
- Prolonged second stage:
  - Diagnosis:
    - Failure to deliver fetus
      - ≥ 2 hours without epidural
      - ≥ 3 hours with epidural
  - Causes: passenger, pelvis, power
  - Management:
    - IV oxytocin if uterine contractions are hypotonic
    - If UC adequate → is the head engaged? → forceps or vacuum
    - Otherwise CS

- Prolonged third stage:
  - Diagnosis: > 30 min
  - Cause: inadequate UCs
  - Management:
    - Medical: IV oxytocin
    - Operative: manual placental removal

Obstetrical Complications During Labour

- Cord Prolapse:
  - CTG shows: variable decelerations
  - Commonest cause: rupture of membranes before engagement!
  - Management: elevate fetal head + emergency CS

- Shoulder dystocia:
  - Complication: upper trunk of brachial plexus might be stretched resulting in "Erb's palsy"
  - Problem: anterior shoulder impacted in pubic symphysis
  - Management:
    - McRoberts maneuver (suprapubic pressure)
    - Corkscre maneuver (rotating the shoulder)
    - Delivery of posterior arm
    - Symphysiotomy (cutting pubic symphysis)

- Obstetrical lacerations:
  - 1st degree: perineal mucosa
  - 2nd " : perineal body muscles (but NOT rectal sphincter)
  - 3rd " : rectal sphincter involved (but NOT rectal mucosa)
  - 4th " : rectal mucosa is involved

- Episiotomy:
  - Types:
    - Midline → more extensions & lacerations into rectum
    - Mediolateral → more pain, more bleeding, harder to repair
  - Not routinely done (more risks than benifits)

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Chapter (15): Obstetric Anesthesia

Prepared by: Ali Jassim Alhashli

- Nerve roots involved in stage -I of labour:
  - $T_{10} - T_{12}$
- Nerve roots involved in stage- II of labour:
  - $S_2 - S_4$ (pudendal nerve)

Anesthetic Options During Labour

- Stag - I:
  - Narcotics:
    - Advantages: IV / IM - inexpensive
    - Disadvantage: used only in stage- I of labour (active phase)
    - Complications: neonatal depression
      - Managed by: naloxone.
  - Paracervical block:
    - Side effect: transitory fetal bradycardia
      - Management: conservative
- Pudendal block:
  - Injection of pudendal nerve (around sacrospinous ligament)
  - Done in Stage - II of labour.
- Epidural block:
  - Done in stage - I of labour
  - Anesthetic injected in epidural space
  - Side effect: hypotension (due to sympathetic NS blockade)
    - Managed by: ephedrine in left lateral position

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Chapter (16): Intrapartum Fetal Monitoring

Prepared by: Ali Jassim Alhashli

Fetal Heart Rate Monitoring

- Common methods of intrapartum FHR monitoring:
  - Intermittent auscultation → for 15 sec X 4 = FHR/min
    - using a fetoscope because FHS is low-frequency
  - Continuous external CTG
  - Continuous internal CTG
- Time when cerebral palsy originates → ANTEPARTUM prior to labour
- Internal fetal scalp electrode: picking-up fetal QRS complexes and substracting maternal QRS complexes
- Internal uterine pressure catheter: measuring hydrostatic pressure

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Evaluation of Fetal Monitoring Tracings

- Fetal outcome with reassuring CTG → normally oxygenated fetus
- Fetal outcome with non-reassuring CTG → normally oxygenated fetus! (99% false-positive results!)
- Criteria for baseline FHR:
  - Normal: 110 - 160 beats/min
  - Tachycardia > 160 beats/min → caused by: β-agonists, parasympatholytics
  - Bradycardia < 110 beats/min → caused by: β-blockers, local anesthetics
- ↓ variability of fetal heart rate → corticosteroids (betamethasone)
- Periodic changes of FHR: transient changes (not lasting > 1-2 minutes)
  - Accelerations: reassuring (15 beats/min lasting for 15 seconds)
  - Decelerations:
    - Eearly → due to head compression of fetus → ignore (no impact on outcome)
    - Late → due to placental insufficiency → always troublesome
    - Variable → due to cord compression → if severe → there is a problem

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Reassuring versus Non-Rassuring

- Criteria for fetal monitoring tracing:
  - [1] Baseline rate normal (110 - 160) → tachycardia/bradycardia
  - [2] Accelerations present
  - [3] Decelerations absent → severe variable decelerations or any late decelerations
  - [4] Variability present → Absent variability

→ Non-Rassuring

Intrauterine Resuscitation Measures

- Definition: generic measures designed to enhance O_2 transport from placenta to the fetus
- Measures:
  - ↓ UCs: discontinue oxytocin (if it is given).
  - ↑ IV volume: 500 ml rapid IV bolus (ringers lactate)
  - High flow O_2: 8-10 L by face mask
  - Change position: from supine to left lateral position
  - Vaginal exam: ruling-out prolapsed cord (especially with variable decelerations)
  - Scalp stimulation: looking for accelerations

Fetal pH Assessment

- Normal fetal scalp pH > 7.20
- Cervix must be dilated, membranes must be ruptured, station must be low enough ⟶ so you can put this device against fetal head

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Chapter (17): Operative Obstetrics

Prepared by: Ali Jassim Alhashli

Obstetric Forceps

- Operative obstetrics include:
  - Forceps
  - Vacuum extractor
  - Cesarean section

  } for prolonged 2nd-stage of labour (especially with occiput posterior)
- Classification of forceps (depending where is the fetal head):
  - Outlet: on the pelvic floor
  - Low: head below +2 station but not reaching pelvic floor
  - Mid: head below 0 station but not reaching +2
  - High: head is above 0 station !! ⟶ not used anymore

Vacuum Extractor

- Being used much more today because experience with using forceps is getting less!
- Indication: prolonged 2nd-stage of labour!
- Maternal complication: vaginal mucosa entrapment
- Neonatal " :
  - Cephalohematoma ⟶ below periosteum
  - Jaundice

Cesarean section (CS)

- Definition: vaginal bypass ⟶ removing fetus from abdominal wall
- Complications:
  - ↑ maternal mortality rate
  - Hemorrhage
  - Infection
  - Injury to bowel & bladder
  - Thrombosis (DVT)
- Why women want cesarean?
  - To protect the pelvic floor ⟶ they don't want to suffer although mortality and morbidity rates are higher with CS than vaginal delivery!
- Uterine incisions:
  - Lower-Segment Cesarean Section (LSCS):
    - Most common; bladder is retracted
    - Advantages: Less bleeding, less adhesions, less risk of rupture
  - Classical:
    - Made in upper Fundus of uterus; bladder is left intact
    - Disadvantages: more bleeding, more adhesions & higher risk of uterine rupture
- Indications for CS:
  - Cephalopelvic disproportion
  - Fetal malpresentation (breech)
  - Non-reassuring CTG

- If a woman has a breech baby and doesn't want CS, what are your options ?
  - External cephalic version (externally rotating the fetus)
    - Success : 60%
    - Performed at 37 wks of gestation (because earlier, spontaneous turning is very common).
- Vaginal Birth After CS (VBAC):
  - Most imp. requirment → previous LSCS
  - Other requirments:
    - Patient consent: aware there is a risk of uterine rupture
    - Non-repetitive indication
    - Clinically adequate pelvis

Elective Cesarean Section

- Recommendations:
  - Individual counsling for each woman regarding risks and benifits
  - Women considering more than 2 children should be aware that a CS causes uterine scarring and they should avoid a primary CS
  - Avoid CS prior to 39 wks of gestation (because dating of pregnancy may not be precise and you end by delivering a premature baby)

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Chapter (18): Postpartum Issues

Prepared by: Ali Jassim Alhashli

Post-Partum Physiological Changes

- Reproductive changes:
  - Involution of uterus to non-pregnant state
  - LOCHIA (shedding of endometrial cells):
    - Rubra → in first few days
    - Serosa → up to 2nd week
    - Alba → After the 2nd week
  - Bright red bleeding → from opened venous placental sinuses
    - Normally uterus contracts to stop this bleeding
      These painful contractions can be managed with analgesics
  - Perined pain → Due to lacerations or episiotomy
    - Management:
      - 1st 24 hrs: ice pack
      - 2nd 24 hrs: heat lamp
- Urinary tract changes:
  - Bladder empties adequatly:
    - Upper accepted limit of residual volume → 250 mL
      - If more than 250 mL
        - Management:
          - Bethanecol
          - Or indwelling foley catheter
- GI tract changes:
  - Hemorrhoids due to constipation
    - Managed by:
      - Oral hydration
      - Stool softners
      - Sitz bath
- Psychosocial problems:
  - Impaired maternal bonding:
    - Risk factors:
      - ↓ neonatal contact: premature baby, baby with congenital anomalies..etc
      - ↓ social support

post partum BLUES (50-70%)	- outpatient - conservative - Social support
post-partum DEPRESION (underdiagnosed)	- outpatient - Psychotherapy - Antidepressants
post-partum PSYCHOSIS (rare!)	- In hospital - Antipsychotics - Psychotherapy

Post-partum Contraception & Immunization

- Post partum contraception:
  - Lactation → only lasting for ≤ 3 months
  - Diaphragm → fit it on 6 weeks after delivery
  - IUD → place it 6 weeks after delivery
  - Oral contraceptives → started 3 weeks after delivery but notice that estrogen will cancel lactation if the woman is breast-feeding
  - Progestins → can be started immediatly after delivery
- Postpartum immunizations
  - RhoGIAM:
    - If mom is Rh (-) and baby is Rh (+) → 300 μg RhoGIAM within 72 hrs of delivery
  - Rubella:
    - If mom is IgG (-) → give active immunization of live-attenuated rubella virus (avoid pregnancy for 1 month).

Postpartum Hemorrhage

- Uterine atony (most common cause - 50%) risk factors:
  - Overworked: rapid labour or prolonged labour
  - Infection: chorioamnionitis
  - Relaxed uterus: due to
    - $MgSO_4$
    - β-adrenergic agonists
    - Halothane
  - Overdistended:
    - Multiple pregnancy
    - Polyhydramnios
    - Macrosomia
- Uterine atony → clinically → doughy uterus (above umbilicus)
- Uterine atony management:
  - Uterine massage
  - Medications:
    - Oxytocin
    - Ergometrine
    - $PGF_{2\alpha}$

- Another cause of post partum hemorrhage → genital lacerations
  - Risk factors: uncontrolled vaginal delivery or use of forceps / vacuum extractor
  - Clinically: bleeding in presence of a contracted uterus
  - Management: surgical repair

- Retained placenta:
  - Risk factors:
    - Accessory lobe (common)
    - Placenta accreta (rare)
  - Clinically: missing cotyledons in presence of contracted uterus
  - Management:
    - Manual removal
    - Curettage under ultrasound guidance

- DIC (a rare cause of postpartum hemorrhage):
  - Risk factors:
    - Placental abruption (most common)
    - Severe pre-eclampsia
    - Fetal demise
  - Clinically:
    - Generalized oozing
    - Petechiae
    - Contracted uterus
  - Management:
    - Remove POC
    - ICU
    - Blood products as needed (fresh frozen plasma, platelets ... etc)

- Uterine inversion (a rare cause of post partum hemorrhage):
  - Uterus is not palpable! although it must be at level of umbilicus
  - Risk factors:
    - Myometrial weakness
  - Clinically: beefy bleeding mass
  - Managment:
    - Elevate vaginal fornices
    - Give IV oxytocin

- Management of unexplained post partum hemorrhage:
  - Ligation of uterine vessels, internal iliac artery or hysterectomy

Postpartum Fever

- The five W's of infection:
  - Wind → Atelectasis
  - Water → UTI
  - Womb → Endometritis
  - Wound → Wound infection
  - Walk → Septic pelvic thrombophlebitis

- Atelectasis (postpartum day = 0):
  - Risk factor: General anesthesia for CS
  - Clinical findings: mild fever + rales
  - Management: pulmonary exercises

- UTI (postpartum days = 1-2)
  - Risk factors: multiple catheterizations and vaginal exams in labour
  - Clinical findings: fever
    Costo-vertebral angle tenderness
    Urinalysis: Leukocytes + bacteria (shown on culture)
  - Management: single agent IV antibiotic (cephalosporin)

- Endometritis (postpartum days = 2-3) - Most common cause
  - Risk factors: Emergency CS done after prolonged period of ROM
    bacteria from vagina to uterus
  - Clinical findings: fever + exquisite uterine tenderness
  - Management: multiple agents IV antibiotic (gentamicin, clindamycin)

- Wound infection (postpartum days = 4-5):
  - Risk factors: Emergency CS done after prolonged period of ROM
  - Clinical findings: fever, cellulitis and wound abscess/drainage
  - Management:
    - Cellulitis: antibiotics
    - Abscess: open wound and pack it

- Septic pelvic thrombophlebitis (post-partum days = 5-6)
  - Risk factors: hypercoagulability, stasis and vessel trauma (associated with emergency CS)
  - Clinical findings: "picket fence" fever (going up and down)
  - Management: IV heparin (for 7-10 days)

- Infectious mastitis (postpartum days: 7-21):
  - Risk factors: lactational nipple trauma
  - Clinical findings: unilateral localized breastitis
  - Management: oral cloxacillin (continue breast feed!)